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Document Name: ASTM D1335: Standard Test Method for Tuft Bind of Pile Floor Coverings

CFR Section(s): 24 CFR 200.945(a)(1)(ii)

Standards Body: American Society for Testing and Materials

Official Incorporator:
THE EXECUTIVE DIRECTOR
OFFICE OF THE FEDERAL REGISTER
WASHINGTON, D.C.

Designation: D 1335 – 67
(Reapproved 1972)

American National Standard L14.221-1973 (R-1968)
Reaffirmed Aug. 10, 1973
By American National Standards Institute

Standard Method of Test for
TUFT BIND OF PILE FLOOR COVERINGS[1]

This Standard is issued under the fixed designation D 1335; the number immediately following the designation indicates the year of original adoption, or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

1. Scope

1.1 This method covers the determination of the force required to pull a tuft completely out of a cut pile floor covering or to pull one or both legs of a loop free from the backing of looped pile floor covering.

NOTE 1—For the determination of other properties of pile floor coverings refer to Methods D 418.

2. Applicable Documents

2.1 *ASTM Standards:*

D 76 Tensile Testing Machines for Textile Materials[2]

D 123 Definitions of Terms Relating to Textile Materials[2]

D 418 Testing Woven and Tufted Pile Floor Coverings[3]

D 1776 Conditioning Textiles and Textile Products for Testing[2]

3. Definitions

3.1 *tuft, n.*—the cut or uncut loops forming the face of a tufted or woven pile floor covering.

3.2 *tuft bind, n.*—the force required to pull a tuft from a cut pile floor covering or to pull free one leg of a loop from a looped pile floor covering.

3.2.1 The tuft bind force is generally expressed in pounds-force but see also 4.1.

3.3 *pile floor covering, n.*—a pile fabric intended for use as a floor covering. The pile may be in the form of cut loops or loops, or both. Both the cut loops and the loops may vary in height.

3.4 *looped pile floor covering, n.*—a pile floor covering in which the pile is composed of uncut loops only.

3.5 *cut pile floor covering, n.*—a pile floor covering in which the pile is composed of tufts in the form of cut loops.

3.6 For definitions of other textile terms used in this method, refer to Definitions D 123.

4. Summary of Method

4.1 The force required to pull a cut loop from a cut pile floor covering or to pull one or both legs of a loop from a looped pile floor covering is determined by means of a tensile testing machine. The required load or force is reported in pounds-force (lbf) or kilograms-force (kgf) or newtons (N).

5. Uses and Significance

5.1 The satisfactory performance of a pile floor covering depends to a considerable extent on the maintenance of its original appearance. In a cut pile floor covering an inadequate tuft bind may result in complete loss of pile in areas exposed to severe wear. In a looped pile floor covering with inadequate tuft bind the pile loops may be pulled out to form unsightly long tufts or occasionally hazardous loops.

5.2 The wide range of capacity of tensile testing machines is specified to cover the application of the method to intermediate products (without back coating) which might have a tuft bind of less than 1 lb and also to cover the use of the method when it is desired to determine that the tuft bind exceeds a specified value of 3 to 4 lb, for example, without taking the time to pull the tuft out completely.

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[1] This method is under the jurisdiction of ASTM Committee D-13 on Textiles, and is the direct responsibility of Subcommittee D13.21 on Pile Floor Coverings.
Current edition effective Sept. 8, 1967. Originally issued 1954. Replaces D 1335 – 60 T.

[2] *1974 Annual Book of ASTM Standards*, Parts 32 and 33.

[3] *1974 Annual Book of ASTM Standards*, Part 32.

5.3 In cases when a floor covering contains both cut and uncut pile, an equal number of each type of pile should be tested.

6. Apparatus

6.1 *Tensile Testing Machine*, conforming to Specifications D 76, with a capacity selected such that the force required to complete the test falls within 20 to 80 percent of full scale. Full-scale loads ranging from 1 to 25 lb (0.5 to 11 kg) are generally adequate. The testing machines must be operable at the specified rates; for constant-rate-of-traverse (CRT) and constant-rate-of-extension (CRE) types—12 ± 0.5 in. (305 ± 10 mm)/min. For constant-rate-of-load (CRL) type, the full load of the tester shall be applied in 20 s.

NOTE 2—The level of test results obtained with different types of testing machines is not always the same.

6.2 *Cylindrical Specimen Holder, Cut-Away Type*, consisting of a 6-in. (152-mm) length of 1.5-in. (38-mm) outside diameter tubing with a section 2 in. (51 mm) long having half of the tubing cut away. See Fig. 1. This specimen holder should be constructed in a manner that will permit clamping the test specimen in the nonmeasuring, pulling clamp of the tensile testing machine or replacement of the nonmeasuring clamp by the specimen holder.

6.3 *Tuft Clamp*, for use only with cut pile floor coverings, consisting of a tweezer-like clamp that can be used to grip a single tuft tightly enough to assure removal of the whole tuft from the fabric without slippage of the tuft in the clamp. Alternatively, a hemostat[4] can be used.

6.4 *Loop Hook*, for use only with looped pile floor coverings, consisting of a hook which can be readily passed through the loop and hooked under the top of the loop. The hook should be made of wire having a diameter of at least $\frac{1}{32}$ in. (0.8 mm) and should be so constructed that it will not cut the loop during the normal test procedure. The shank of the hook should be so constructed that it can be clamped in the measuring clamp or can replace the measuring clamp of the test machine.

NOTE 3—Because the tuft clamp or loop hook is attached to, or replaces, the usual measuring clamp of the test machine, it is necessary to compensate for the effect of the altered weight of the clamp to retain the previous calibration of the testing machine.

7. Sampling

7.1 Take a lot sample and a laboratory sample as directed in the applicable material specification or as agreed upon by the purchaser and the seller. In the absence of such a specification or prior agreement, select a sample representative of the roll or piece to be tested and of sufficient size so that five specimens each about 6 in. (150 mm) wide and about 8 in. (200 mm) long can be cut from it.

NOTE 4—If the pile floor covering is back coated, exercise care in handling the sample in order that the back coating is not broken or otherwise disturbed.

8. Conditioning

8.1 Bring the specimens to moisture equilibrium for testing in the standard atmosphere for testing textiles approaching equilibrium from the dry side. Determine that moisture equilibrium for testing has been attained as directed in Method D 1776.

9. Preparation of Apparatus

9.1 If required, replace the nonmeasuring clamp of the test machine with the specimen holder described in 6.2.

9.2 Replace the measuring clamp of the test machine with, or attach to the measuring clamp of the test machine, the tuft clamp described in 6.3 or the loop-hook described in 6.4, depending upon which is required for the type of pile floor covering under test (Note 3).

10. Procedure

10.1 Test the conditioned specimens in the standard atmosphere for testing textiles.

10.2 Adjust the constant-rate-of-traverse (CRT) or the constant-rate-of-extension (CRE) type testing machine to operate at a rate of 12 ± 0.5 in. (305 ± 10 mm)/min. Adjust the constant-rate-of-load (CRL) type tester so that the full load is applied in 20 s.

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[4] Hemostats suitable for this purpose can be obtained from the Fisher Scientific Co., Catalog 65, Catalog No. 8-907, Forceps, Kelly Hemostatic.

10.3 *Cut Pile Floor Coverings:*

10.3.1 Mount the test specimen on the specimen holder with the rows of tufts at a right angle to the long axis of the holder in such a position that the tuft to be tested is approximately centered over the cut-away portion of the specimen holder. Adjust the tension so that the specimen presents an undistorted cylindrical surface over the cut-away section of the specimen holder. Locate the tuft to be pulled directly below the center of the pulling clamp or hook.

10.3.2 Select only one tuft for testing from any one row of tufts and allow at least 1 in. (26 mm) between any tuft tested and the edge of the specimen.

10.3.3 Using the tuft clamp grip one leg (side) of the original loop. Make certain that all fibers forming the tuft are securely gripped by the tuft clamp. Take care not to pinch, "break the back," or otherwise deform the carpet in the selection of, and attachment of the clamp to, the tuft under test.

10.3.4 Determine tuft bind in pounds-force or kilograms-force to the nearest 0.1 lbf or 50 gf required to pull out the tuft from the pile floor covering.

10.3.5 Repeat this procedure on two additional tufts from different rows of tufts.

10.4 *Looped Pile Floor Covering:*

10.4.1 Mount the test specimen on the specimen holder as described in 10.3.1.

10.4.2 Select a location where three adjacent loops are formed by the same end. Cut completely through the first and third loops and test the center loop (Note 5). See Fig. 2.

NOTE 5—If this procedure is not followed, a spurious value may be obtained if one or both ends of the loop under test is buried in the back construction for a number of construction unit repeats.

10.4.3 Insert the loop hook in the loop to be tested. Determine the pounds-force or kilograms-force to the nearest 0.1 lbf or 50 gf required to pull at least one leg of the loop from the pile floor covering.

10.4.4 Repeat this procedure on two additional loops from other rows of loops.

11. Calculations

11.1 Calculate the average force required for all specimens tested for a sample to the nearest 0.1 lbf (50 gf).

12. Report

12.1 State that the tests were performed as directed in ASTM Method D 1335. Describe the product tested and the method of sampling used.

12.2 Report the following information:

12.2.1 Average tuft bind in pounds-force or kilograms-force to the nearest 0.1 lbf or 50 gf value of the test results,

12.2.2 Number of specimens tested,

12.2.3 Type of floor covering tested, and

12.2.4 Type of tensile testing machine on which the tests were performed.

13. Precision and Accuracy

13.1 *Within-Laboratory Precision*—The within-laboratory precision, at the 95 percent probability level, of the average of three replicates is expected to be within ±7 percent of the average tuft bind.

13.2 *Between-Laboratory Precision*—The precision, at the 95 percent probability level, of the difference between two laboratories, each making three measurements, is expected to be within ±15 percent of the average tuft bind.

NOTE 6—These values of precision are based on interlaboratory testing by three laboratories on a series of samples that represent most styles of currently produced carpets.

13.3 *Accuracy*—No justifiable statement on the accuracy of Method D 1335 for the measurement of the tuft bind of pile floor coverings can be made since the true value of the property cannot be determined by an accepted referee method.

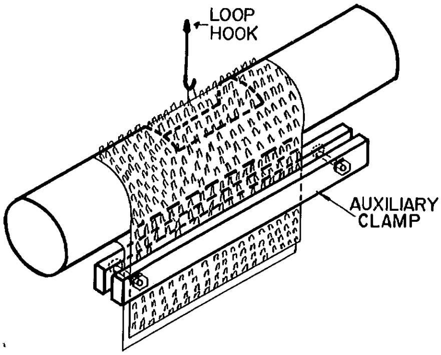

FIG. 1 Specimen Holder, Cut-Away Type.

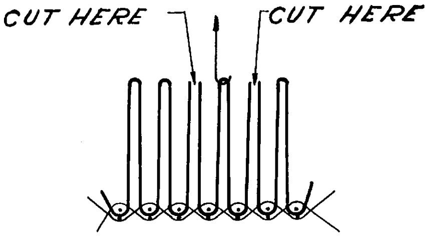

FIG. 2 Arrangement of Hook and Loops for Testing.

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